User Manual

M Line Maritim HMI

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Valid for:	TPM70XIT-12/32xxxxxxx-xx TPM104XiT-12/32xxxxxxx-xx TPM121XiT-12/32xxxxxxx-xx TPM151XIT-12/32xxxxxxx-xx

Version	Date	Modifications
1	2014-03-20	First Edition

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1 Important Notes

1.1 Symbols

The symbols in this manual are used to draw your attention on notes and dangers.

This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

DANGER
This indicates a hazardous situation which, if not avoided, will result in death or serious injury.

WARNING
This indicates a hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION
This indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

NOTICE
This symbol together with the signal word NOTE and the accompanying text alert the reader to a situation which may cause damage or malfunction to the device, hardware/software, or surrounding property.

This symbol and the accompanying text provide the reader with additional information or refer to detailed sources of information.

1.2 Safety Notes

- Read this manual carefully before using the operating device. Keep this manual in a place where it is always accessible to all users.
- Proper transportation, handling and storage, placement and installation of this product are prerequisites for its subsequent flawless and safe operation.
- This user manual contains the most important information for the safe operation of the device.
- The user manual, in particular the safety notes, must be observed by all personnel working with the device.
- Observe the accident prevention rules and regulations that apply to the operating site.
- Installation and operation must only be carried out by qualified and trained personnel.

1.3 Intended Use

- The device is designed for use in maritime areas.
- The device is state-of-the art and has been built to the latest standard safety requirements. However, dangerous situations or damage to the machine itself or other property can arise from the use of this device.

– The device fulfills the requirements of the EMC directives and harmonized European standards. Any modifications to the system can influence the EMC behavior.

NOTICE: Radio Interference
This is a class A device. This device may cause radio interference in residential areas. In this case, the user may be required to introduce appropriate countermeasures, and to bear the cost of same.

1.4 Target Group

The use of products described in this manual is oriented exclusively to:

– Qualified electricians or persons instructed by them, who are familiar with applicable standards and other regulations regarding electrical engineering and, in particular, the relevant safety concepts.
– Qualified application programmers and software engineers, who are familiar with the safety concepts of automation technology and applicable standards.

2 Installation and Commissioning

2.1 Unpacking the Device

Unpack all parts carefully and check the contents for any visible damage in transit. Also check whether the shipment matches the specifications on your delivery note.

If you notice damages in transit or discrepancies, please contact us immediately.

2.2 Mounting the Device

DANGER
The following safety distances to a compass must be kept depending on the display size of the operating device:

	Display <= 7"	Display > 7"
Standard compass	0.75 m (29.527")	2.2 m (86.614")
Steering compass	0.45 m (17.716")	1.35 m (53.149")

NOTICE: Damage
When installing the device, leave a gap of at least 30 mm (1.181") around the device to ensure sufficient air circulation.

NOTICE: Damage
When the operating device is installed horizontally, please note that additional sources of heat beneath the operating device may result in heat accumulation. Make sure to allow sufficient heat dissipation!
Please observe the permissible temperature range specified in the technical data of the user manual when operating the device.

NOTICE: Damage
In order to ensure the degree of protection specified in the technical data, always make sure that the seal lies flat against the mounting surface and the threaded pins of the mounting brackets are tightened uniformly to a maximum torque of 1 Nm.

The device can be easily and quickly mounted from the rear of the device. A panel thickness of 1 mm to 6 mm (0.039" to 0.236") is permitted for proper mounting.

1. Insert the device in the mounting cutout from the front.

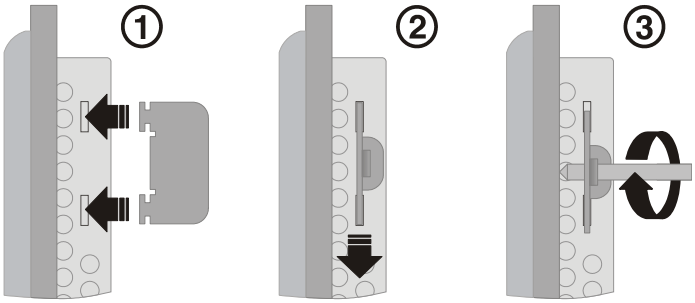


Figure 2-1 Mounting the device using a mounting bracket

2. Insert the mounting brackets into the appropriate openings (1) and pull the brackets downwards until they lock in place (2).
3. Fasten the device into position using the threaded pins (3).

2.2.1 Front Panel Dimensions

2.2.1.1 TPM70XiT

Bild 2-2 TPM70XiT

2.2.1.2 TPM104XiT

Bild 2-3 TPM104XiT

2.2.1.3 TPM121XiT

Bild 2-4 TPM121XiT

2.2.1.4 TPM151XiT

Bild 2-5 TPM151XiT

2.2.2 Mounting Cutout

2.2.2.1 TPM70XiT

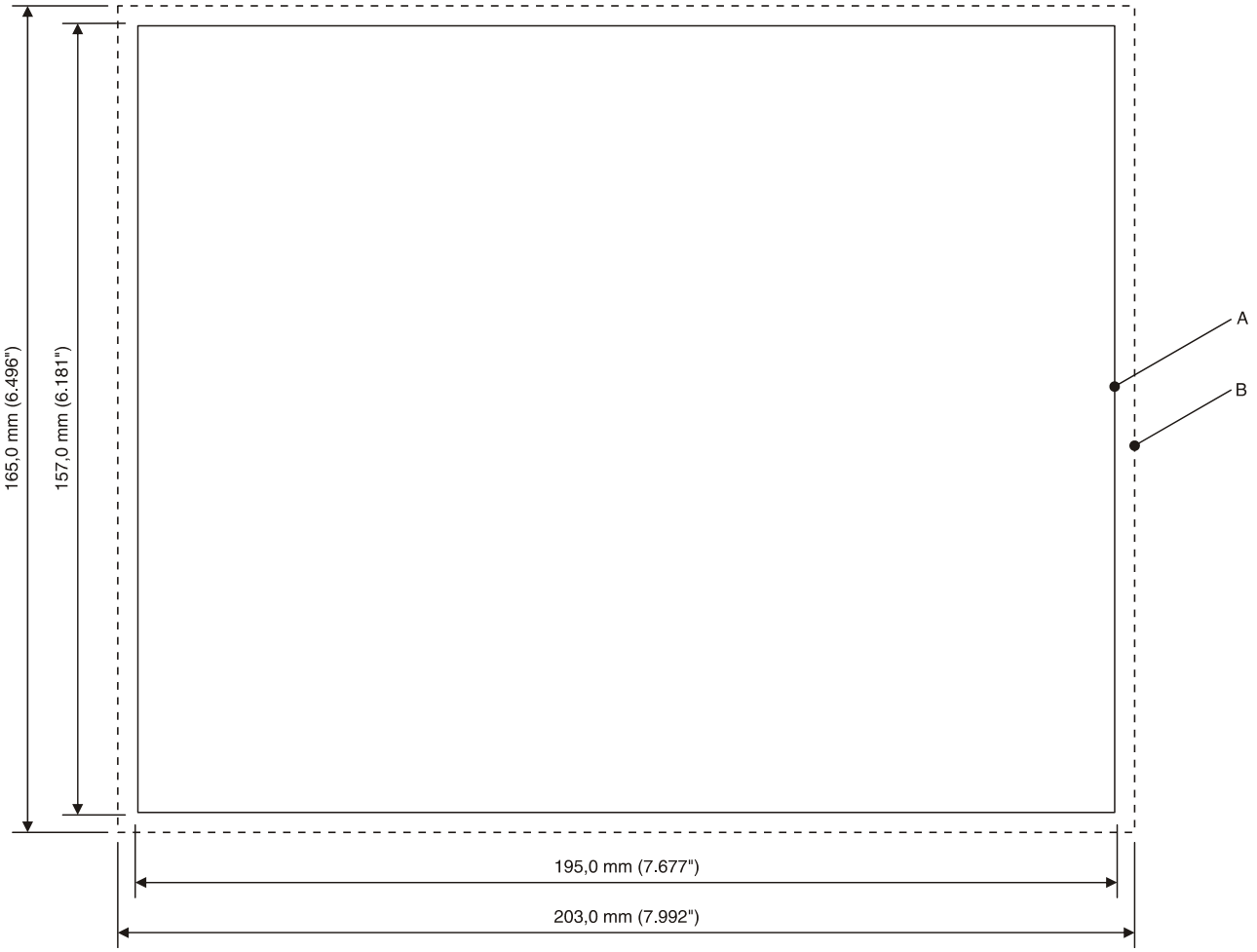


Bild 2-6 TPM70XiT

A Mounting Cutout
B Front Panel

2.2.2.2 TPM104XiT

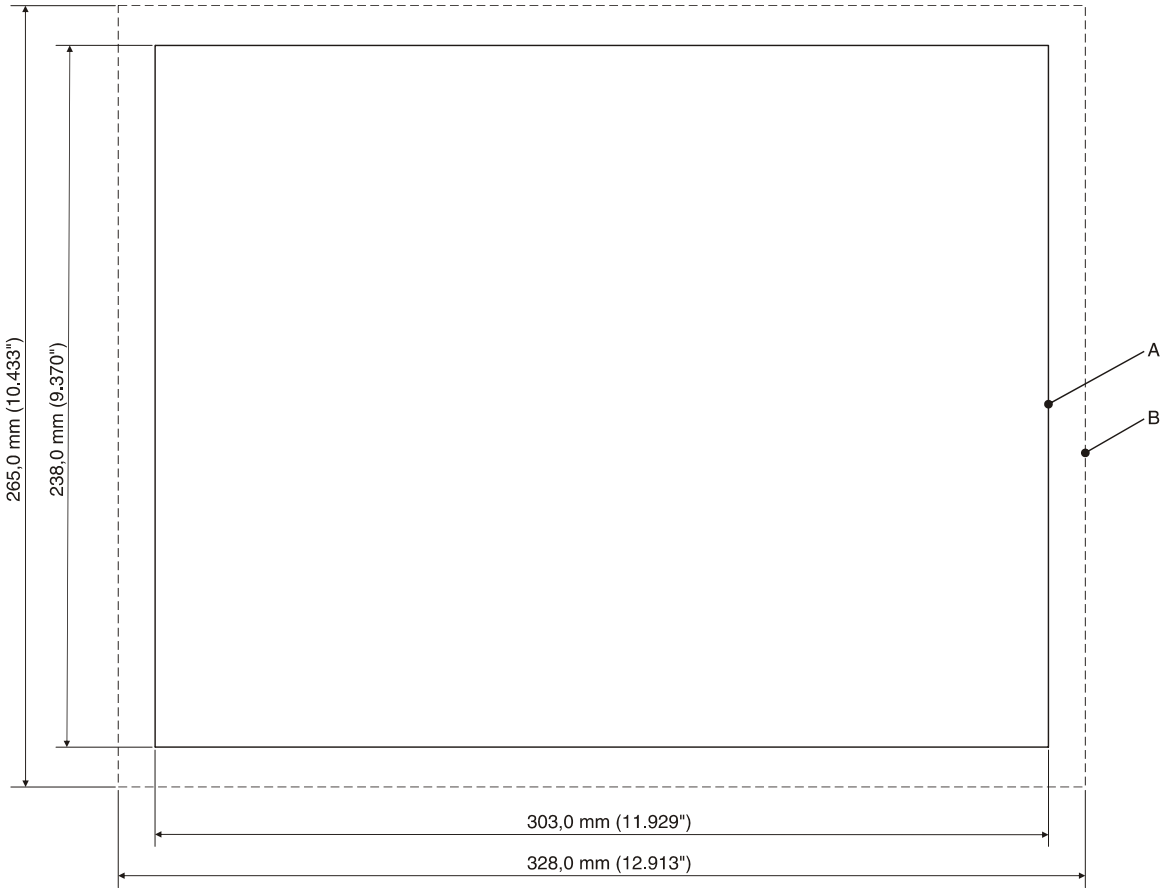


Bild 2-7 TPM104XiT

A Mounting Cutout
B Front Panel

2.2.2.3 TPM121XiT

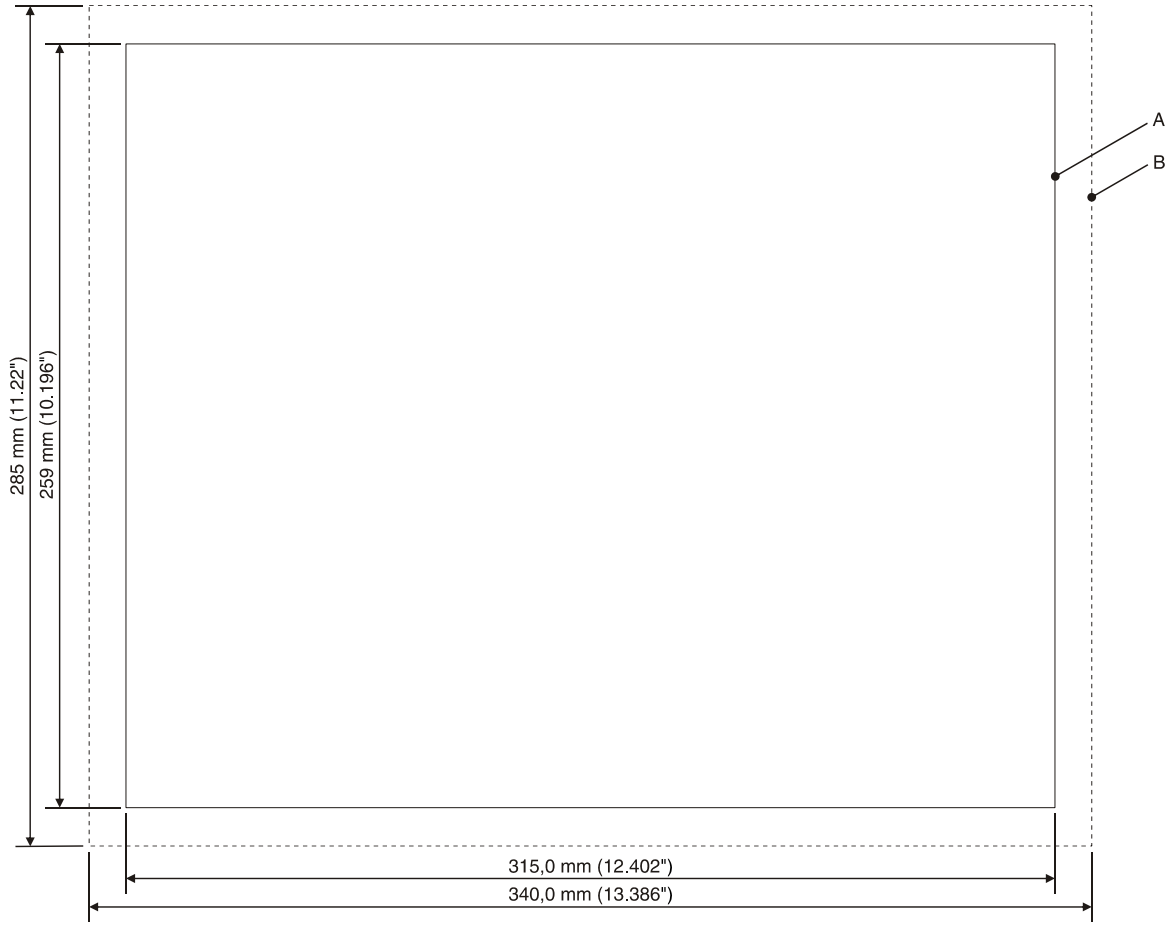


Bild 2-8 TPM121XiT

A Mounting Cutout
B Front Panel

2.2.2.4 TPM151XiT

Bild 2-9 TPM151XiT

A Mounting Cutout
B Front Panel

2.2.3 Side View, Mounting Depth

2.2.3.1 TPM70XiT

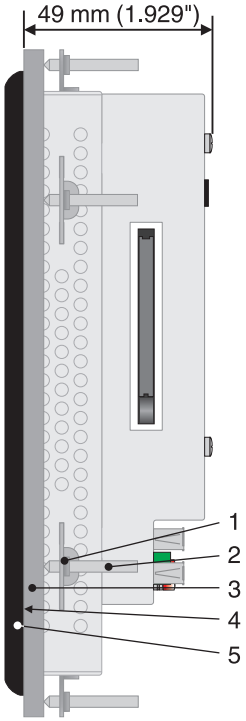


Bild 2-10 TPM70XiT

1 Mounting Bracket
2 Threaded Pin
3 Mounting Surface Thickness 1 mm to 6 mm
4 Circumferential Seal
5 Front Panel

2.2.3.2 TPM104XiT

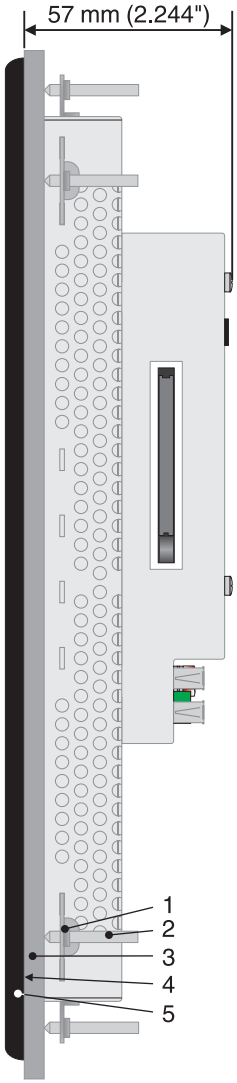


Bild 2-11 TPM104XiT

1 Mounting Bracket
2 Threaded Pin
3 Mounting Surface Thickness 1 mm to 6 mm
4 Circumferential Seal
5 Front Panel

2.2.3.3 TPM121XiT

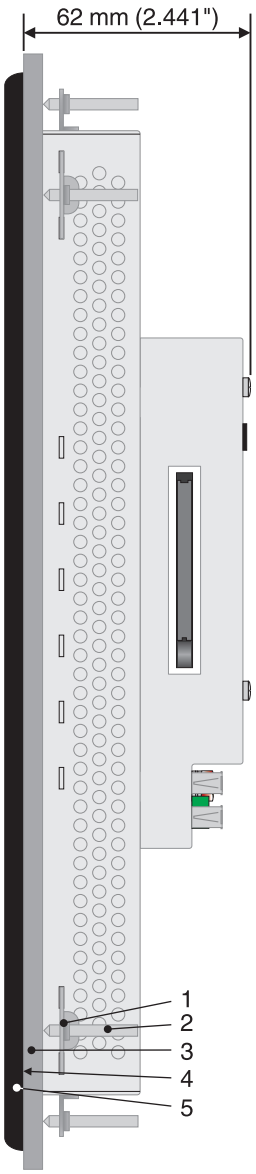


Bild 2-12 TPM121XiT

1 Mounting Bracket
2 Threaded Pin
3 Mounting Surface Thickness 1 mm to 6 mm
4 Circumferential Seal
5 Front Panel

2.2.3.4 TPM151XiT

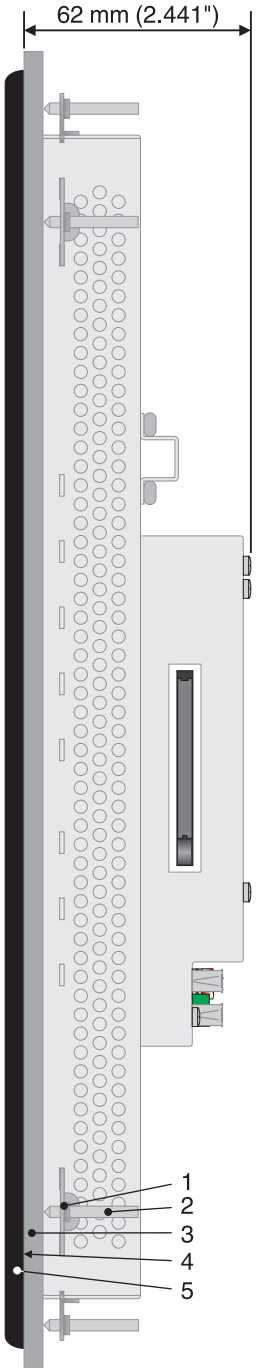


Bild 2-13 TPM151XiT

1 Mounting Bracket
2 Threaded Pin
3 Mounting Surface Thickness 1 mm to 6 mm
4 Circumferential Seal
5 Front Panel

2.3 Connecting the Device

2.3.1 Supply Voltage

The supply voltage is supplied via pin strip X1. A suitable socket strip is supplied.

Refer to the technical data for the permissible supply voltage of the operating device.

The device has reverse polarity protection. In case of wrong polarity, the device will not operate.

This is a protection class I device. For safe operation, safety extra-low voltage (SELV) in accordance with DIN EN 61131 must be used for the supply voltage.

Connector in the operating device: 3 pin pin strip

Table 2-1 Pin assignment supply voltage

Pin	Designation	Function
1	⏚	Noiseless ground / functional earth ground (FE)
2	0 V	Supply voltage 0 V (GND)
3	⎓ 24 V	Supply voltage ⎓ 24 V

DANGER: Hazardous voltages
Hazardous voltages can exist inside electrical installations that can pose a danger to humans. Coming in contact with live parts may result in electric shock!

NOTICE: Damage
Cables with finely stranded copper conductors with a minimum cross-section of 0.75 mm² (18 AWG) and a maximum cross-section of 2.5 mm² (14 AWG) must be used for the supply voltage.
You must adhere to the following torques at the connector:
Screw connection of terminal blocks: 0.22 Nm (minimal) to 0.25 Nm (maximum)
Screw flange: 0.3 Nm (maximum)

Use the following procedure to connect the device to the supply voltage:

1. Strip approx. 30 mm (1.181") off the outer cable sheath and approx. 5 mm (0.197") off the wires.

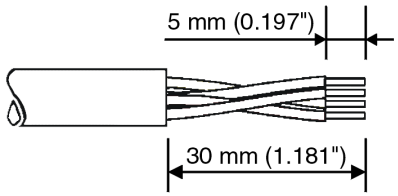


Figure 2-14 Preparing the cable

2. Fit the wires with wire end ferrules and connect the wires to the socket strip.
3. Plug the socket strip onto pin strip X1.
4. Secure the socket strip in place with a screw-type locking to prevent it from slipping out.

2.3.2 Grounding

The grounding is performed - depending on the type of device - with a slip-on sleeve (noiseless ground / functional earth ground) or a ring cable lug (protective ground).

NOTICE: Damage
A separate copper conductor must always be provided for the grounding. The conductor must have a minimum cross-section of 1.5 mm² (16 AWG) and must be kept as short as possible.
You must adhere to a maximum torque of 1 Nm at an protective grounding on the threaded bolt.

1. Strip approx. 5 mm (0.197") off the wires.
2. Fit the stripped wires - depending on the type of device - with a slip-on sleeve or a ring cable lug.
3. Plug the slip-on sleeve on the flat tab or mount the ring cable lug with the nut to the threaded bolt.

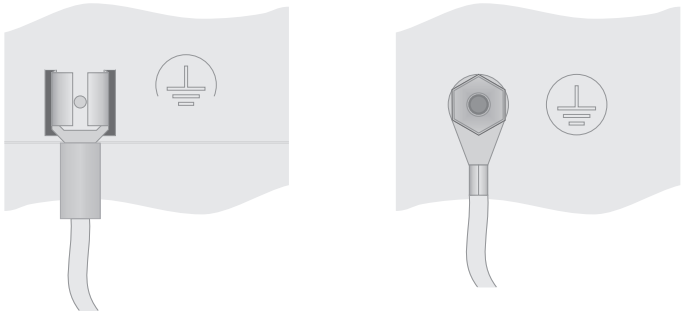


Figure 2-15 Noiseless ground / protective ground

2.4 Switching On

The Windows CE operating system is installed on the operating device. Running on the operating system is the visualization runtime.

2.4.1 Loading Procedure on Windows CE Operating System

The program allows you to use the buttons to make changes to the configuration.

The operating device has 3 operating modes:

– Normal (no button is pressed)
– Setup Main (Button **Press For Setup Main Menu** was pressed)
– Administration (**Admin** button was pressed)

2.4.1.1 Launch Structure

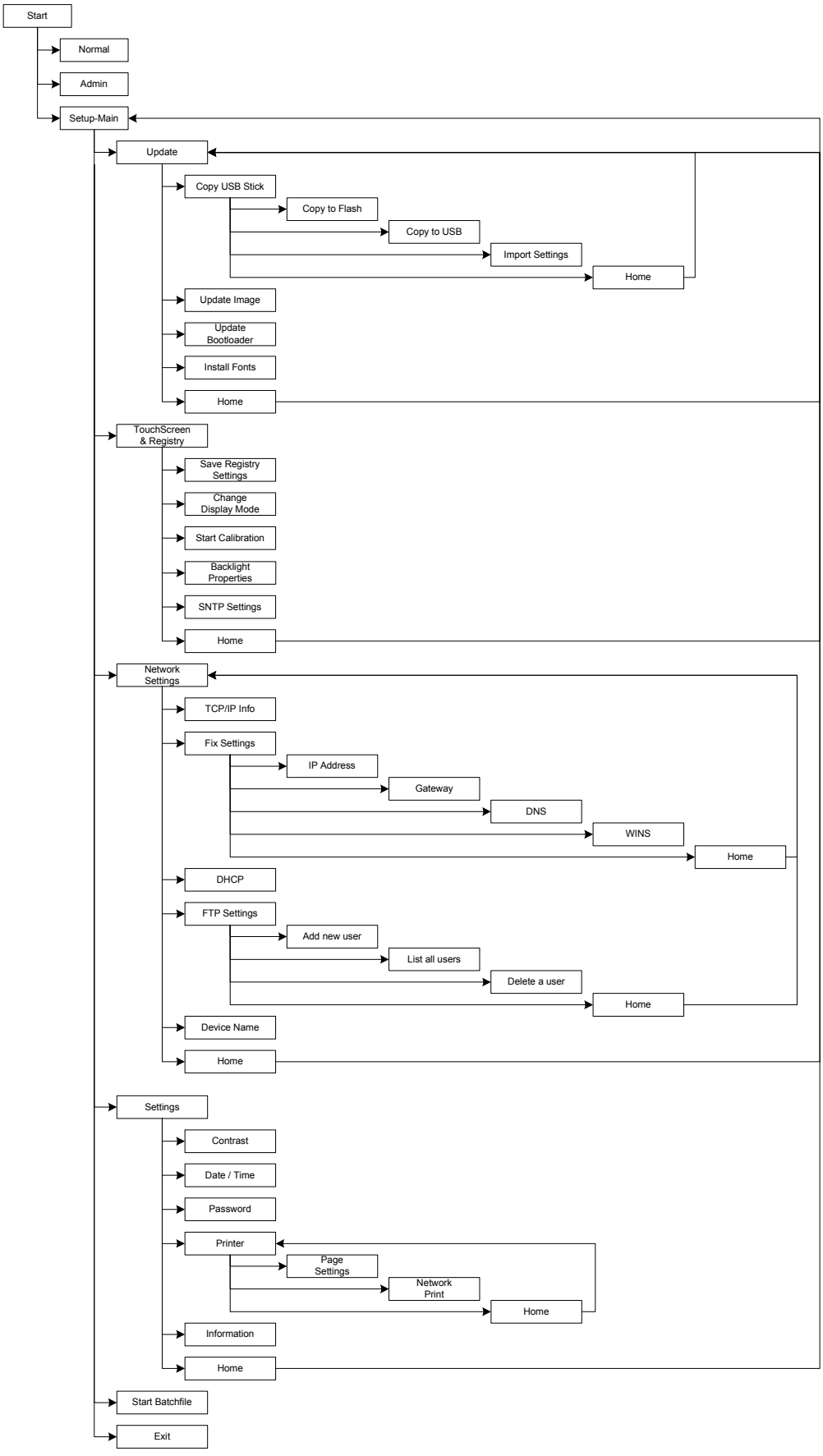


Figure 2-16 Launch structure

2.4.1.2 Normal Mode

The program AppStarter.exe starts from the internal Flash memory.

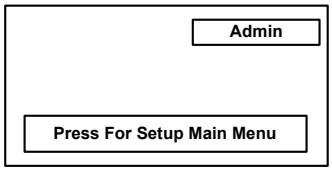


Figure 2-17 Display after startup

Please, note that the device is accessible over the Ethernet only after assignment of an IP address to the Ethernet.

2.4.1.3 Setup Main Mode

If you press the **Press For Setup Main Menu** button during the startup phase, the "Setup Main" mode starts.

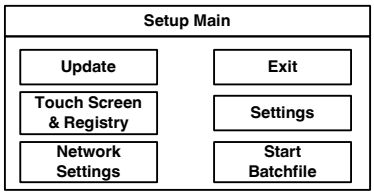


Figure 2-18 Setup Main

Some settings are password-protected. The default password is "+-+-".

Update:

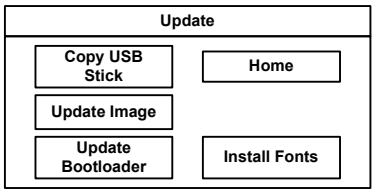


Figure 2-19 Update

Update, Copy USB Stick:

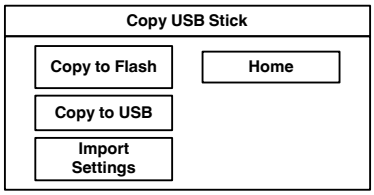


Figure 2-20 Copy USB Stick

Update, Copy USB-Stick, Copy to Flash:

This function copies the data from the USB stick to the internal flash file system.

Several projects can be managed in subdirectories below the directory TSvisRT. If more than one project is in different subdirectories, a choice dialog is displayed. Only directories which contain a project file (*.cb) are listed.

The entire TSvisRT directory or the corresponding subdirectory and the AppStarter.exe are copied into the target directory of the flash file system.

Update, Copy USB Stick, Copy to USB:

Copies the content of the flash file system to the „backup“ directory of the USB stick. This excludes protected system files. A log file is also transferred, which can be used to restore system settings via the „Import Settings“ item.

Update, Copy USB Stick, Import Settings:

An automatically generated log file can be used to restore the system settings. If the „backup“ directory of the USB stick contains a corresponding log file, these settings can be restored.
This is possible only when using identical device types.

Update, Update Image:

If the „image“ subdirectory on the USB stick contains a „*.nb0“ file, this file is used to perform the image update. There must be only one „*.nb0“ file located in this directory, otherwise the update does not start.

In this case, the flash registry is always deactivated so that the image is processed with a new default registry.

Update, Update Bootloader:

If the „bootloader“ subdirectory on the USB stick contains a „*.nb0“ file, this file is used to perform the bootloader update. There must be only one „*.nb0“ file located in this directory, otherwise the update does not start.

Update, Install Fonts:

If one or multiple fonts are in the subfolder "Fonts" of the flash memory, these will be installed at the start-up of the operating device automatically.

Depending on the number and size of fonts, the system start-up take correspondingly more time.

Touch Screen & Registry:

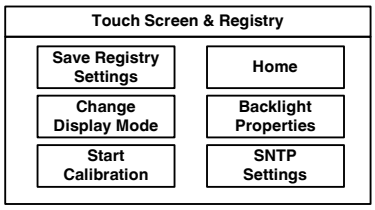


Figure 2-21 Touch Screen & Registry

Touch Screen & Registry, Save Registry Settings:

The entire registry is saved.

Touch Screen & Registry, Change Display Mode:

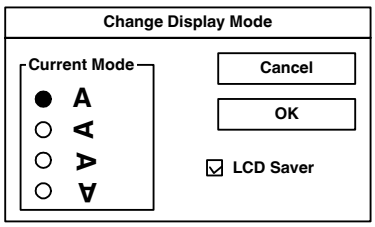


Figure 2-22 Change Display Mode

Set-up of display adjustment.

LCD Saver switches the brightness to the lowest value, if no user operation occures for at least one hour.

This entry is able to be password-protected.

Touch Screen & Registry, Start Calibration:

The touch calibration is started. After the calibration the values are stored automatically in the registry.

Touch Screen & Registry, Backlight Properties:

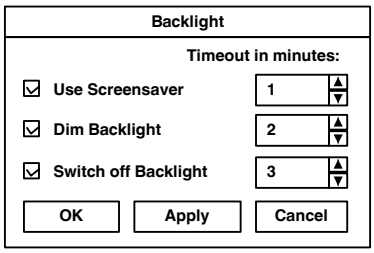


Figure 2-23 Backlight Properties

A screen saver can be activated after the defined time (minutes). It is possible to adjust the screen saver graphic by replacing the file "Screensaver.bmp" in the internal memory. The graphic is replaced at the start up of the operating device automatically when a USB stick - containing the file (Screensaver.bmp) in the "Screensaver" directory - is present.

The brightness of the backlight (dim backlight) can be reduced after the defined time (minutes) and turned off (backlight switch off) in addition.

This entry is able to be password-protected.

Touch Screen & Registry, SNTP Settings:

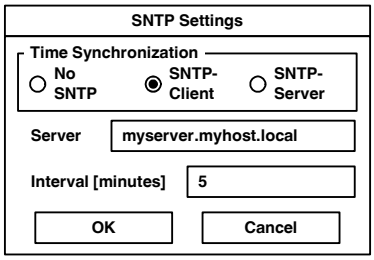


Figure 2-24 SNTP Settings

If you activate the "SNTP-Client" option, you can enter the address of a time server located in the intranet or Internet. The synchronization interval is specified in minutes.
With the option "No SNTP" the synchronization is deactivated.
The operating device may be used as a time server for other devices if the "SNTP-Server" option is active.

This entry is able to be password-protected.

Network Settings:

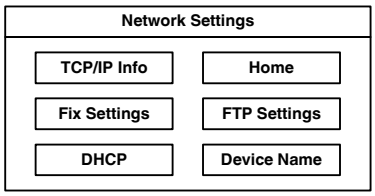


Figure 2-25 Network Settings

All addresses of the **Network Settings** have to be entered in the format "xxx.xxx.xxx.xxx".
Numbers smaller than 100 have to be filled up with leading zeros.
(e.g.: 192.168.42.1 -> 192.168.042.001)

Network Settings, TCP/IP Info:

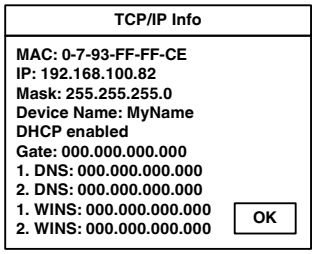


Figure 2-26 TCP/IP Info

The following informations are displayed:

– MAC address
– IP address,
– Subnet mask address,
– Device name,
– DHCP status,
– Gateway address,
– 1. DNS address,
– 2. DNS address,
– 1. WINS address,
– 2. WINS address.

Network Settings, Fix Settings, IP Address:

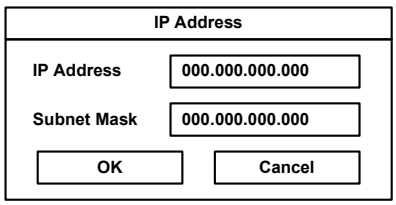


Figure 2-27 IP Address

The system automatically deselects DHCP and optionally enters the settings from the „IPSetting.ini“ file of the USB stick. This file must exist in the root directory of the USB stick.
If no USB stick is connected the information is read from the registry.

This entry is able to be password-protected.

Contents of the „IPSetting.ini“ file:

```
[IPCONFIG]
IPAddress=172.016.042.150
SubnetMask=255.255.255.000
```

Network Settings, Fix Settings, Gateway:

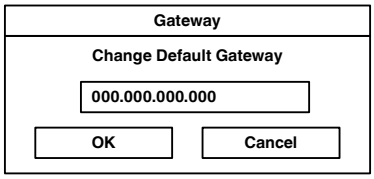


Figure 2-28 Gateway

The system automatically deselects DHCP and optionally enters the settings from the „IPSetting.ini“ file of the USB stick. This file must exist in the root directory of the USB stick.
If no USB stick is connected the information is read from the registry.

This entry is able to be password-protected.

Contents of the „IPSetting.ini“ file:

```
[IPCONFIG]
Gateway=172.016.042.150
```

Network Settings, Fix Settings, DNS:

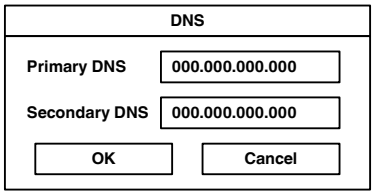


Figure 2-29 DNS

The system deselects DHCP and enters the settings from the „IPSetting.ini“ file of the USB stick. This file must exist in the root directory of the USB stick.
If no USB stick is connected the information is read from the registry.

This entry is able to be password-protected.

Contents of the „IPSetting.ini“ file:

```
[IPCONFIG]
PrimaryDNS=172.016.042.150
SecondaryDNS=172.016.042.151
```

Network Settings, Fix Settings, WINS:

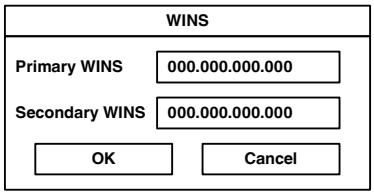


Figure 2-30 WINS

The system automatically deselects DHCP and optionally enters the settings from the „IPSetting.ini“ file of the USB stick. This file must exist in the root directory of the USB stick.
If no USB stick is connected the information is read from the registry.

This entry is able to be password-protected.

Contents of the „IPSetting.ini“ file:

```
[IPCONFIG]
PrimaryWINS=172.016.042.150
SecondaryWINS=172.016.042.151
```

Network Settings, DHCP:

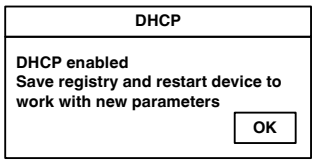


Figure 2-31 DHCP

You may enable DHCP service. You must save this setting when exiting of by using „Save Registry Settings“.

This entry is able to be password-protected.

Network Settings, FTP Settings, Add new user:

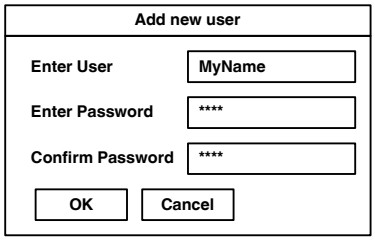


Figure 2-32 Add new user

You may enter a new user name. You have to assign a password to the user name and to confirm it.

If at least one user name is added you cannot login to the FTP server as anonymous anymore.

Network Settings, FTP Settings, List all users:

All users are listed within a DOS box.

Network Settings, FTP Settings, Delete a user:

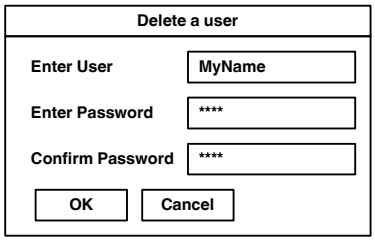


Figure 2-33 Delete a user

You may enter the user name you like to delete.

This entry is able to be password-protected.

Network Settings, Device Name:

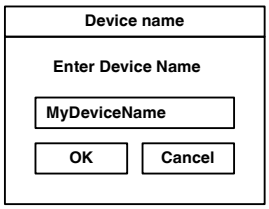


Figure 2-34 Device Name

You can define a device name with up to 14 characters. Via a FTP connection you can access the device with the device name instead of the IP address.

This entry is able to be password-protected.

Settings:

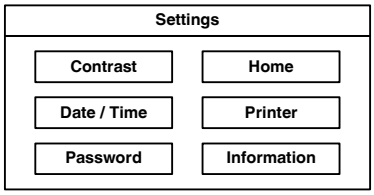


Figure 2-35 Settings

Settings, Contrast:

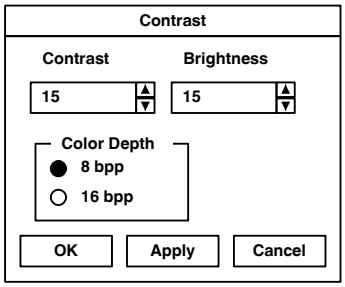


Figure 2-36 Contrast

The operating mode setup main is displayed with default values for contrast and brightness to ensure reading also at faulty values. If you change a value, you have to confirm this in a dialog. If you press **Cancel** or 5 seconds pass without any action the value is not accepted.
Depending on the display type different values can be influenced:

Display Type	Contrast	Brightness
STN (mono)	X	-
STN (color)	X	X
TFT	-	X

Selection of color depth for TFT displays.

This entry is able to be password-protected.

Settings, Date / Time:

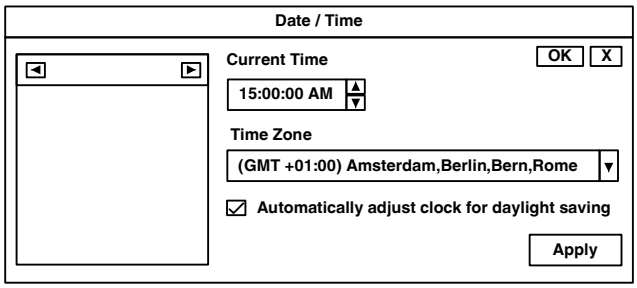


Figure 2-37 Date / Time

Set the date, time and time zone.

Settings, Password:

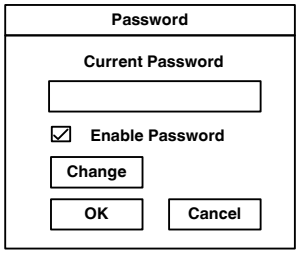


Figure 2-38 Password

The password can be activated, deactivated or redefined. When the password is activated, all password-protected dialog boxes can only be accessed if the password has been entered successfully.

This entry is able to be password-protected.

Settings, Printer:

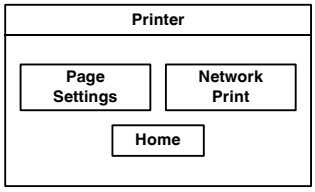


Figure 2-39 Printer

The print function depends on the application program on the operating device. Connection of a printer is possible via the network and the USB interface. The operating system supports PCL3-compatible printers.

Table 2-2 Already used printer models

Model
HP OfficeJet 6000
HP OfficeJet Pro 8000
HP DeskJet 6940
HP DeskJet 5150
HP Laserjet 1505N

This entry is able to be password-protected.

Settings, Printer, Page Settings:

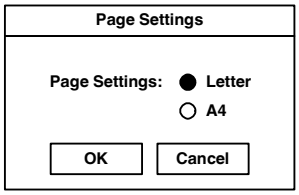


Figure 2-40 Page Settings

Select the paper format, "Letter" or "A4", "Letter" is default.

This entry is automatically stored in the registry.

Settings, Printer, Network Print:

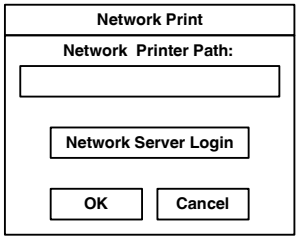


Figure 2-41 Network Print

Enter the network printer path.

This entry is automatically stored in the registry.

Settings, Printer, Network Print, Network Server Login:

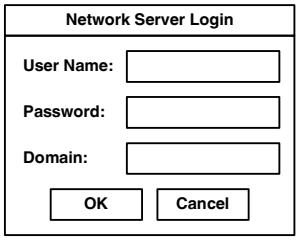


Figure 2-42 Network Server Login

You can save login data for network printing. This enables auto-login when printing without manual input at the operating device.

Enter a user name, password and domain.

This entry is automatically stored in the registry.

Settings, Information:

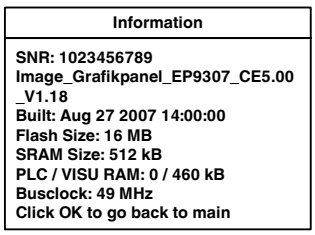


Figure 2-43 Information

The following informations are displayed:

– Serial number
– Product ID
– Image version
– Built version
– Built date
– Size of flash
– Size of SRAM
– Size of PLC / Visu RAM
– Bus clock speed

Start Batchfile:

The „project.bat“ file in the „FlashDrv“ directory starts, if available.

2.4.1.4 Administration Operating Mode

If you press the **Admin** button during the startup phase, the Administration mode of operation starts.

You can use the Admin.ini file to manage the device. This file must exist in the root directory of the USB stick.

This file is used as a dongle to prevent users from changing the device during normal operation.

Possible contents for the Admin.ini file:

Observe upper and lower case for all entries!

Explorer=Off	Deactivates the Explorer in the registry. The change becomes effective on the next device reboot.
Explorer=On	Activates the Explorer in the registry. The change becomes effective on the next device reboot.
Start=explorer.exe	Starts the explorer
Start=MyProgram.exe	Starts the application MyProgram.exe Initial directory is windows. Use the following syntax to start an application on the usb stick: Start=\\\\HardDisk\\MyProgram.exe Use multiple entries to start several applications.
Registry=Default	Destroys the current registry and activates the default registry of the image. The change becomes effective on the next device reboot.
StartRepllog=On	Enables automatic startup of the Repllog.exe program in the registry. The change becomes effective on the next device reboot.
StartRepllog=Off	Disables automatic startup of the Repllog.exe program in the registry. The change becomes effective on the next device reboot.
LaunchTouch=On	The touch variant of the launch will start at devices with keyboard. The change becomes effective on the next device reboot.
LaunchTouch=Off	The standard variant for the device will start. The change becomes effective on the next device reboot.
Lock=On	The buttons **Press for Setup Main Menu** and **Admin** are disabled. If the file „Admin.ini“ is found on the usb stick the button **Admin** is enabled. Therefore the deactivation of the lock is possible. The change becomes effective on the next device reboot.
Lock=Off	All buttons enabled. The change becomes effective on the next device reboot.
Mode=Development	The shell has full functionality. The change becomes effective on the next device reboot.

Mode=Standard	The Shell is restricted: No task bar and task switch available. Desktop contains the launch icon only. The change becomes effective on the next device reboot.
DeviceName=MyName	Defines the device name of the operating device
;DeviceName=MyName	Comment, no impact

2.5 Identification

The operating device can be identified using the nameplate on the rear of the device.

Bild 2-44 Nameplate (example)

1 Order number
2 Version key (at time of delivery)
3 MAC address
4 Voltage and power specification
5 Serial number

2.5.1 Version Key

The version key provides information on the version level of various components at time of delivery.

3 Control and Display Elements

3.1 Display

DANGER: Toxic
If the display is damaged, avoid touching, swallowing or breathing in the liquids or gases which may leak out!

DANGER: Corrosive
If the display is damaged, avoid touching, swallowing or breathing in the liquids or gases which may leak out!

Pixel failures, which can occur with TFT displays, are due to production and no complaint reason!

The operating device is equipped with different displays depending on variant.

3.2 Dimming

Adjust the brightness to the surrounding conditions at reached operating temperature to be able to read the display optimally.

+ The **Plus** key encreases the brightness of the display step-by-step. When the key is held down, the function is repeated.

– The **Minus** key decreases the brightness of the display step-by-step. When the key is held down, the function is repeated at an automatically increasing rate of repetition.

The adjusted brightness level is not stored remanently.

With an upcoming alarm message the brightness level is automatically set to a higher level.

Assign the brightness level for upcoming alarm messages with the projecting software.

After all alarm messages are acknowledged the brightness is set to the preset level.

3.3 Internal Alarm Indicator

Upcoming alarm messages can be indicated audible by the internal alarm indicator. Simultaneously the relay contact for the external alarm indicator is switched.

Assign the alarm messages which should be indicated by the internal alarm indicator with the projecting software.

3.4 Touch Screen

The device is equipped with a resistive 4 wire touch screen. You operate the device using this touch screen.

NOTICE: Damage
Pointed or sharp objects, such as pens or fingernails, can lead to irreparable damages of the touch screen. Exclusively therefore use the fingertips or the aids indicated in the technical data for the operation.

NOTICE: Damage
To protect the touch screen you can use special protection foils. You receive corresponding protection foils directly from Sütron electronic.

3.5 "Reset" Button

The reset key is located on the rear of the device. You can use this key to restart the device.

4 Interfaces of the Device

4.1 Standard Interfaces

Several interfaces are located at the side an the bottom of the operator panel.

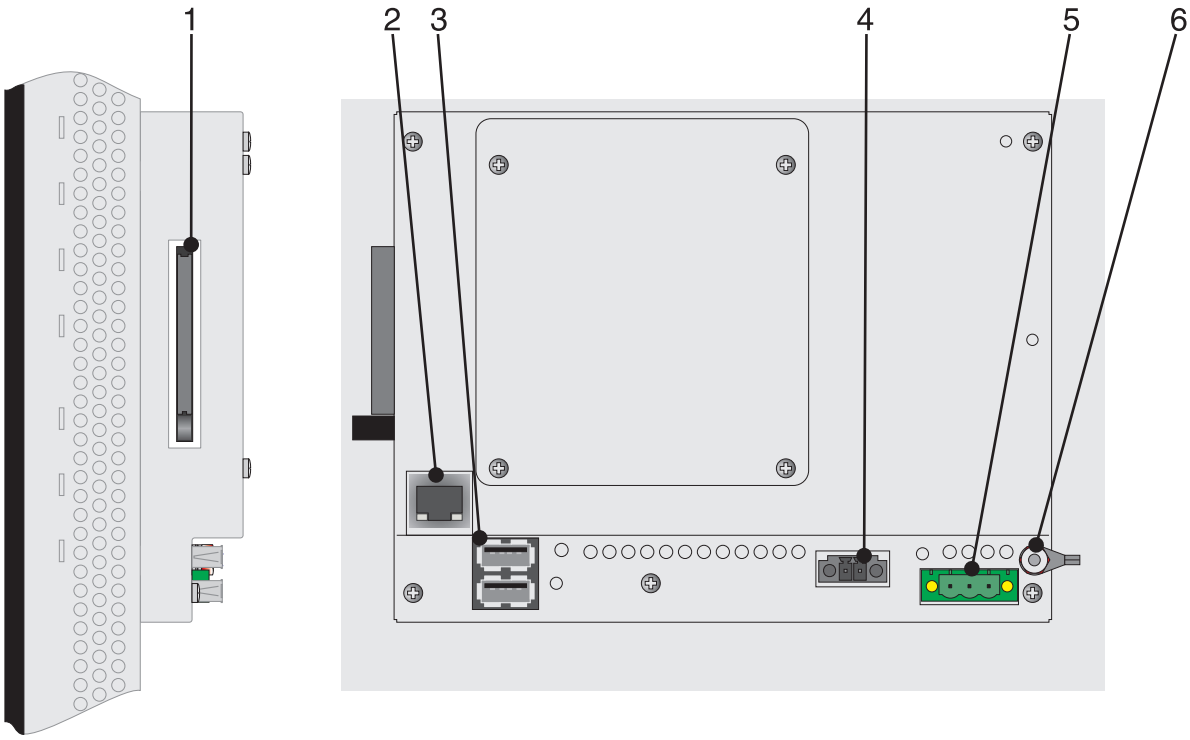


Bild 4-1 Standard interfaces

1 CompactFlash, Inserted on the Side on the Operating Device
2 Female Connector X5 (Ethernet)
3 Female Connector X9, X10 (USB Host - Type A)
4 Male Connector X11 (External Alarm Indicator)
5 Connector X1 (Supply Voltage)
6 Threaded Bolt For Protective Grounding

4.1.1 Ethernet (X5)

A 10/100Base-T Ethernet interface is located at the operating device.

4.1.1.1 Pin Assignment

Connector in the operating device: RJ45 female connector.

Tabelle 4-1 Assignment of the Ethernet interface

Pin	Designation	Function
1	Tx+	Transmitted Data, Positive Polarity
2	Tx-	Transmitted Data, Negative Polarity
3	Rx+	Received Data, Positive Polarity
4	n.c.	Not Connected
5	n.c.	Not Connected
6	Rx-	Received Data, Negative Polarity
7	n.c.	Not Connected
8	n.c.	Not Connected

4.1.1.2 Cable

NOTICE
Use a twisted pair cable of category 5 (CAT 5). The maximum cable length is 100 m (328.084 feet).

See the IEEE 802.3 standard for further information.

4.1.1.3 Diagnosis

Ethernet diagnostics LEDs are located at the operating device.

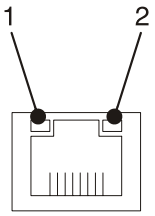


Bild 4-2 Arrangement of the ethernet diagnostics LEDs

Tabelle 4-2 Ethernet diagnostics LEDs

No.	Color	State	Designation	Function
1	Green	On	LNK 100	Operation in mode 100 MBit/s and proper connection with 100BASE-T hub
2	Yellow	On	ACT	Sending / receiving ether-net data telegram

4.1.2 USB (X9, X10)

Two host interfaces are available on the operating device.

NOTICE
Using the USB interfaces while normal operating mode is not permitted for maritime applications!
For maritime applications the use of the USB interfaces is allowed for servicing operations only!

NOTICE
Using hardware not suitable for industrial use (e.g. keyboard, mouse, memory card) may decrease safety of operation. This includes hardware intended for home and office use.

4.1.2.1 Cable

For the specification of a suitable cable, please refer to the „Universal Serial Bus Specification Rev. 1.1“.

NOTICE
The maximum cable length for the cable used is 2.5 m (8.202 feet).

4.1.3 External Alarm Indicator (X11)

The operating device is equipped with a potential-free relay make contact, which is switched simultaneously with the internal alarm indicator.

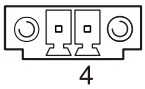


Bild 4-3 Male connector for external alarm indicator

Connect this output with an alarm indicator which is provided by a separate voltage supply.

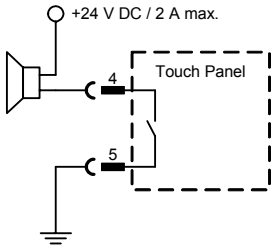


Bild 4-4 Wiring diagram for the external alarm indicator

4.1.4 Memory Card

You can insert a CompactFlash card on the side of your operating device. The CompactFlash card allows you to exchange projects between the PC and the operating device.

You can recognize the rear side of a CompactFlash card by the notches on each side of the card.

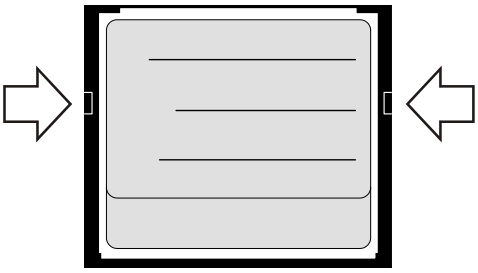


Figure 4-5 Rear view of the memory card

4.1.4.1 Inserting the Memory Card

When you insert the card from the rear side of the operating device, make sure the front side of the card is visible. Insert the card until it snaps into place.

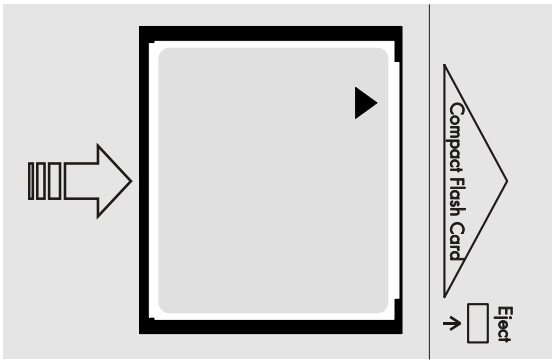


Figure 4-6 Inserting the memory card

4.1.4.2 Ejecting the Memory Card

To remove the card, press the ejection button on the operating device.

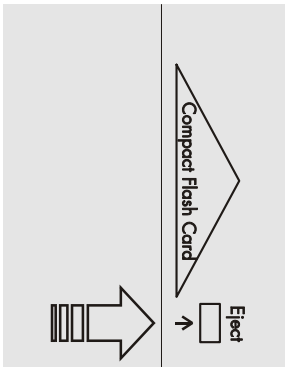


Figure 4-7 Ejecting the memory card

4.2 Field Bus Slave Interfaces

4.2.1 MPI Slave (X6)

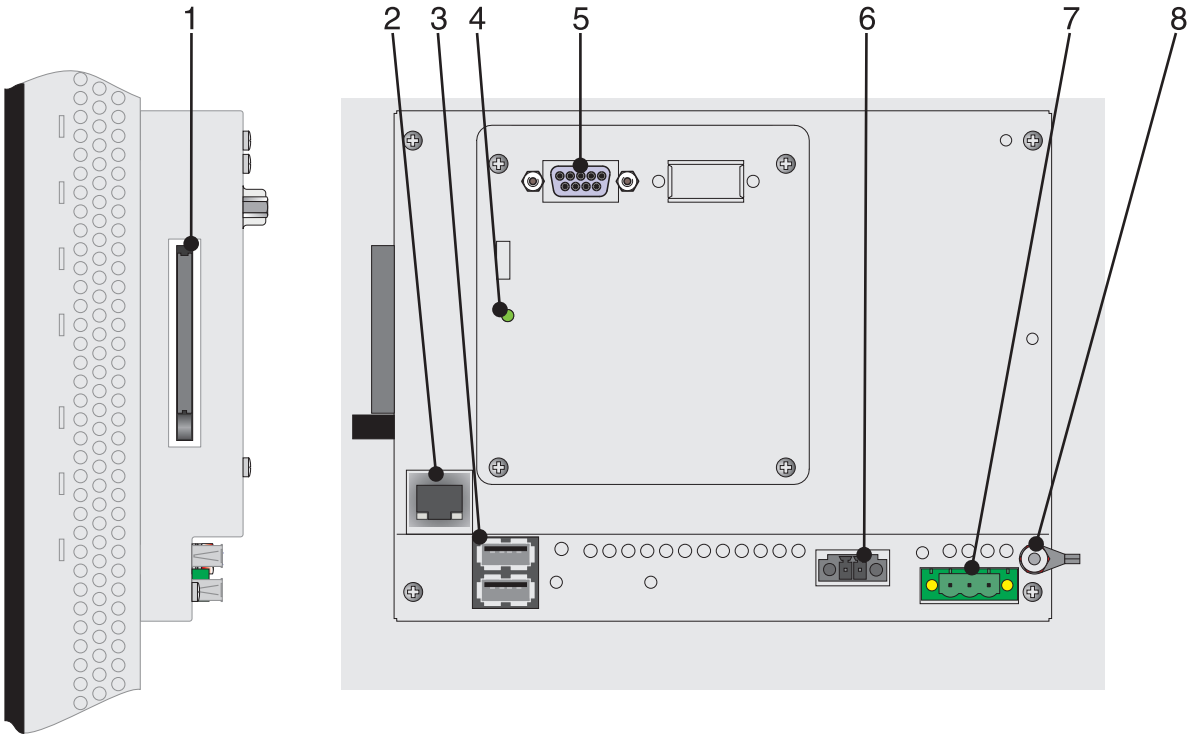


Bild 4-8 MPI slave

1 CompactFlash, Inserted on the Side on the Operating Device
2 Female Connector X5 (Ethernet)
3 Female Connector X9, X10 (USB Host - Type A)
4 Diagnostics LED (MPI)
5 Female Connector X6 (MPI)
6 Male Connector X11 (External Alarm Indicator)
7 Connector X1 (Supply Voltage)
8 Threaded Bolt For Protective Grounding

4.2.1.1 Pin Assignment

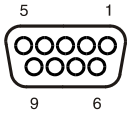


Bild 4-9 9 pin D-SUB female connector strip

Connector in the terminal: 9 pin D-SUB female connector

Tabelle 4-3 Pin assignment MPI

Pin	Designation	Function
1	nc	Not Connected
2	nc	Not Connected
3	RxD/TxD-P	Received Data / Transmitted Data Plus
4	CNTR-P	Repeater Control Signal Plus
5	DGND	Data Transmission Potential
6	VP	Supply Voltage of Terminators Plus
7	nc	Not Connected
8	RxD/TxD-N	Received Data / Transmitted Data Minus
9	CNTR-N	Repeater Control Signal Minus

NOTICE
The D-SUB connector strips must be shielded sufficiently. See chapter “Shielding D-SUB Connectors“ on page 6-51.

4.2.1.2 Cable

NOTICE
Any cable that conforms with the following parameters can be used:

Table 4-4 Cable characteristics MPI

Parameters	Value
Loop Resistance	110 Ohm/km
Capacitance	30 nF/km
Surge Impedance	150 Ohm

The maximum length of one segment is 50 m which cannot be exceeded. This 50 m applies from the first node to the last node in the segment.

For further information on the installation, refer to the Siemens manual "SIMATIC S7-400 and M7-400 Programmable Controllers Hardware and Installation, 6ES7498-8AA03-8BA0".

4.2.1.3 Termination

The bus line is terminated at the connector.
For point-to-point connections, always activate the termination. For multi-point connections, only activate the termination at the cable end. For spur lines, always deactivate the termination.

4.2.1.4 Diagnostics

A diagnostics LED is located on the rear of the operating device. The LED shows the states of the bus system.

The diagnostics LED on the operating device has the following functions:

Tabelle 4-5 Function of the MPI diagnostics LED

Color	State	Function
Green	Flashing	Operating Device has the Token

4.2.2 PROFIBUS-DP Slave (X6)

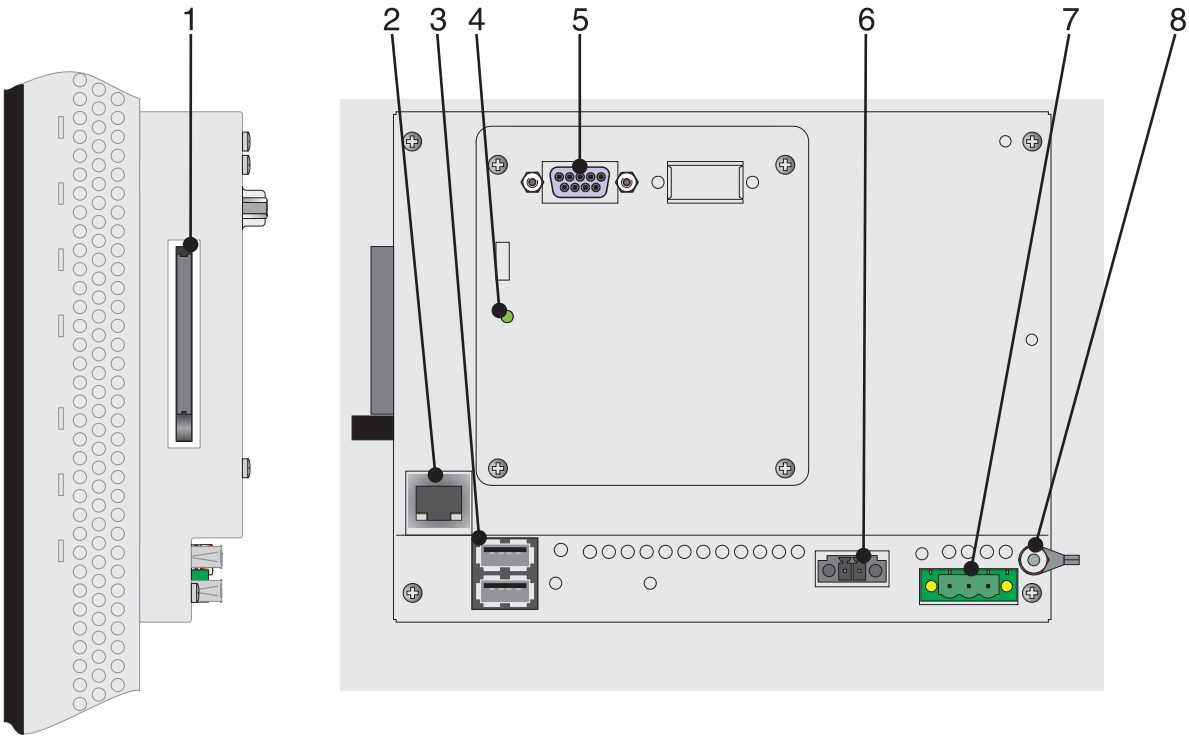


Bild 4-10 PROFIBUS-DP slave

1 CompactFlash, Inserted on the Side on the Operating Device
2 Female Connector X5 (Ethernet) on the Side of the Operating Device
3 Female Connector X9, X10 (USB Host - Type A)
4 Diagnostics LED (PROFIBUS-DP)
5 Female Connector X6 (PROFIBUS-DP)
6 Male Connector X11 (External Alarm Indicator)
7 Connector X1 (Supply Voltage)
8 Threaded Bolt For Protective Grounding

4.2.2.1 Pin Assignment

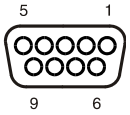


Bild 4-11 9 pin D-SUB female connector strip

Connector in the operating device: 9 pin D-SUB female connector.

Tabelle 4-6 Pin assignment PROFIBUS-DP

Pin	Designation	Function
1	nc	Not Connected
2	nc	Not Connected
3	RxD/TxD-P	Received Data / Transmitted Data Plus (+) (red)
4	CNTR-P	Repeater Control Signal Plus (+)
5	DGND	Ground for data signals and VP
6	VP	Supply Voltage (+5 V) of Terminators Plus
7	nc	Not Connected
8	RxD/TxD-N	Received Data / Transmitted Data Minus (-) (green)
9	CNTR-N	Repeater Control Signal Minus (-)

NOTICE
The D-SUB connector strips must be shielded sufficiently. See chapter “Shielding D-SUB Connectors“ on page 6-51.

4.2.2.2 Cable

NOTICE
Any PROFIBUS-DP-approved cables specified in the EN 50170 as cable type A can be used.

Table 4-7 Cable characteristics PROFIBUS

Parameters	Value
Impedance	136 to 165 Ohm
Capacitance	< 30 pf/m
Loop Resistance	110 Ohm/km
Wire Gauge	0.64 mm

The maximum cable length depends on the baud rate (DIN EN 19245 Part 3).

Table 4-8 Baud rate PROFIBUS-DP

Baud Rate	Cable Length
187.5 kBit/s	1000 m
500 kBit/s	400 m
1500 kBit/s	200 m
3000 to 12000 kBit/s	100 m

4.2.2.3 Termination

Terminate the PROFIBUS at both ends by terminating resistors. If you are using special PROFIBUS connectors, these resistors are usually integrated into the connector and can be connected.

4.2.2.4 Diagnostics

A diagnostics LED is located on the rear of the operating device. The LED shows the state of the bus system.

The diagnostics LED on the operating device has the following functions:

Table 4-9 Function of the PROFIBUS-DP diagnostics LED

Color	State	Function
Green	On	Communication Active

4.3 Shielding D-SUB Connectors

You must shield D-SUB connectors as follows:

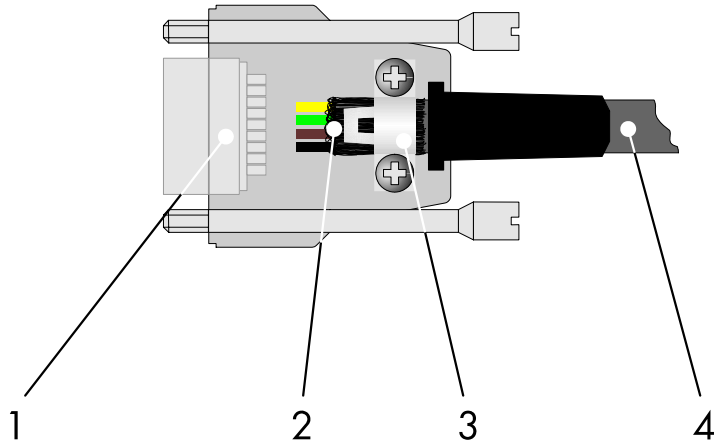


Bild 4-12 Shielding D-SUB connectors

1 D-SUB connector
2 Shield
3 Cable clip
4 Cable

The shield must be folded back into a flat position over the cable sheath.

When fastening the cable with the cable clip, as much of the shielding as possible must be in contact with the housing and sufficient strain relieve must be ensured.

5 Maintenance and Servicing

5.1 Maintenance Interval

The following maintenance intervals are recommended for this operating device:

Tabelle 5-1 Maintenance interval

Maintenance work	Interval
Changing the Battery	4 Years

5.2 Front Panel

Only use a damp cloth to remove any dirt from the front panel.

5.3 Fuse

NOTICE: Damage
The semiconductor fuse cannot be replaced!

A semiconductor fuse is used to protect the device. Once the fuse has been tripped, the device must be disconnected from the supply voltage to allow the semiconductor fuse to regenerate. At an ambient temperature of 20 °C (68 °F), the regeneration takes approximately 20 seconds. The higher the ambient temperature, the longer the regeneration takes.

5.4 Battery (Option)

The built-in battery supplies the real-time clock. The minimum battery life is 5 years, even under unfavorable operating conditions.

We recommend to change the battery approximately every 4 years as part of the regular maintenance work. A prepared battery including connector can be obtained directly from Sütron electronic.

5.4.1 Changing the Battery

CAUTION: Explosive
Do not throw lithium batteries into fire, do not heat to 100 °C or higher and do not recharge.

CAUTION: Toxic
Do not open lithium batteries.

NOTICE: Damage
Batteries must only be changed by authorized and trained experts!

NOTICE: Damage
For changing the battery you may only use replacement batteries of Sütron electronic.

NOTICE: Damage
Electrostatic discharge can damage electronic components. Observe the ESD protective measures!

To ensure the time is preserved, it is possible to change the battery under operating voltage. Observe the safety notes!

1. Disconnect the connector strip of the supply voltage.
2. Remove the screws (see figure) on the rear panel of the device.
3. Remove the interface plate if necessary (foursquare).
4. Lift off the enclosure.
5. Plug in the connector strip of the supply voltage.
6. Disconnect the connector strip of the battery an remove the dead battery.
7. Clean the inside of the enclosure to remove rests of glue if necessary.
8. Plug in the cable for the new battery.
9. Remove the liner from the adhesive pad of the battery.
10. Fasten the new battery on the inside of the enclosure.
11. Disconnect the connector strip of the supply voltage.
12. Place the enclosure back onto the device.
13. Place the interface plate onto the enclosure if necessary.

While mounting the enclosure observe that all nibs are fitting into the corresponding notches of the underneath enclosure.

14. Carefully tighten the screws of the enclosure and then the screws of the interface plate.

15. Plug in the connector strip of the supply voltage.

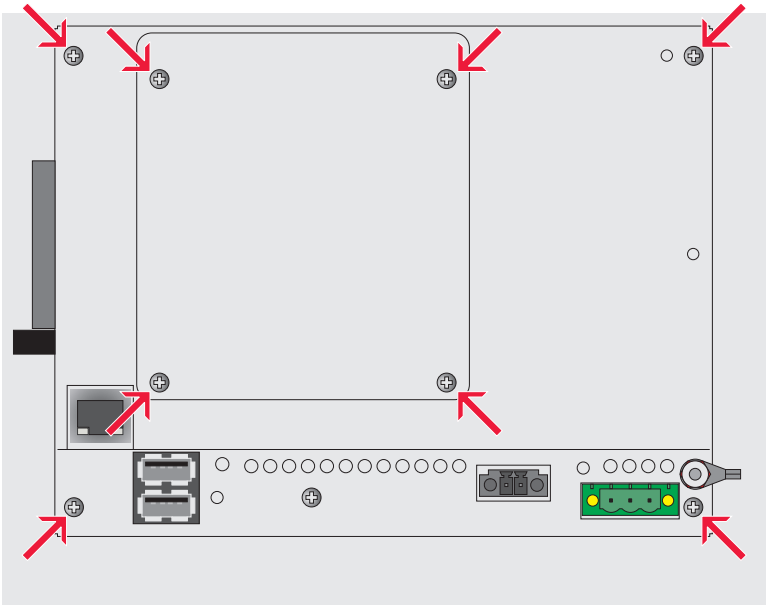
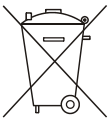


Figure 5-1 Screws on the operating device

5.4.2 Battery Disposal



The manufacturer is obliged to mark batteries with this symbol before first placing into market. The symbol is extended by the chemical symbols if the following limiting values are exceeded:

More than 0.0005 mass percent mercury	Hg
More than 0.002 mass percent cadmium	Cd
More than 0.004 mass percent lead	Pb

Batteries can be given back free of charge after use at the place of purchase.

According to the §11 of the battery law, final consumers are obligedly to give old batteries back to gathering points which attached to the common take back system or manufacturer-specific take back systems.

NOTICE: Damage
To prevent short circuitry in the collection boxes, insulate the poles of each battery with insulation tape or put each single battery into a plastic bag.

6 Technical Data

6.1 General

Touch Screen	
Type	Analog resistive, 4 wire technology
Activation force	15 g (Standard) With R8 HS60 silicon rubber
Durability	No damages or malfunctions after 3 million keystrokes as the following: Keystroke element: R8, HS40 silicon rubber Keystroke load: 150 g Keystroke frequency: 3 Hz

Ethernet	
X5 Ethernet	10/100Base-T

Field Bus Slave Interfaces	
Variable baud rates and data formats	
X6 MPI	Galvanically isolated
X6 PROFIBUS-DP	Galvanically isolated

USB	
Corresponds to the "Universal serial bus specification Rev. 1.1“	
X9, X10 Host	Min.: 1.5 Mbit/s Max.: 12 Mbit/s Max. output current 100 mA per output

External Alarm Indicator	
Potential-free relay make contact	
X11	Maximum switching voltage: 24 V DC Maximum switching current: 2 A DC

Central Processing Unit	
Central Processing Unit	RISC CPU PXA320
Clock frequency	806 MHz
Other features	Real-time clock (accuracy: +/- 200 ppm)

Memory	
Flash (Internal)	1 GByte

Memory (Forts.)	
SDRAM	128 MByte
SRAM	1 MByte
CompactFlash interface for CompactFlash type I and II	

Connection System
Male connector strip Phoenix COMBICON, 3 pin
Male connector strip Phoenix MINI-COMBICON, 2 pin
RJ45 female connector
USB female connector A

Environmental Conditions	
Temperature during operation	0 °C to 55 °C (- 32 °F to 131 °F)
Temperature during storage, transport	- 25 °C to + 70 °C (- 13 °F to 158 °F)
Relative air humidity for operation and storage	20 % to 85 %, no condensation
Application area	Degree of pollution 2, overvoltage category III No direct solar radiation

Standards and Guidelines	
Interference immunity	EN 61000-4-2 EN 61000-4-3 EN 61000-4-4 EN 61000-4-5 EN 61000-4-6 EN 61000-6-2
Emitted interference	EN 50011 limit class value A
Equipment requirements	EN 61131
Storage and transportation	EN 61131 part 2
Power supply	EN 61131 part 2
Electromagnetic compatibility	2004/108/EG
Degree of protection	EN 60529
Impact load, shocks	EN 60068 part 2-27
Sinusoidal vibrations	EN 60068 part 2-6
Corrosion protection	IEC 60068

NOTICE: Radio Interference
This is a class A device. This device may cause radio interference in residential areas. In this case, the user may be required to introduce appropriate countermeasures, and to bear the cost of same.

Approvals
ABS, BV, CE, DNV, GL, LR, UL, cUL

6.2 TPM70XiT

Display	
Size (diagonal) in cm (inch)	17.78 (7)
Type	TFT (color)
Resolution (pixels)	800 x 480
Colors	65535
Reading angle (vertical / horizontal)	130° / 140°
Backlight	LED
Half-life backlighting	40,000 h
Brightness in cd/m^2	350
Display area (H x W) in mm (Inch)	91.4 x 152.4 (3.598 x 6.0)

Electrical Data	
Supply voltage	24 V DC (SELV / PELV in accordance with DIN EN 61131)
Residual ripple	10 % maximum
Minimum voltage	18 V
Maximum voltage	30 V
Power consumption (typical at 24 V)	0.7 A
Power consumption (maximum)	1.0 A
Connected load	16.8 W
Fuse	Semiconductor fuse, self-resetting
Protection against polarity reversal	Integrated

Front Panel and Enclosure	
Enclosure	Steel sheet, galvanized
Front panel material	Aluminium, brushed, black anodized
Front panel (H x W x D) in mm (Inch)	165 x 203 x 5 (6.496 x 7.992 x 0.197)
Seal	Circumferential rubber seal on the rear
Mounting cutout (H x W) in mm (Inch)	157 x 195 (6.181 x 7.677)

Front Panel and Enclosure	
Mounting depth in mm (Inch)	49 (1.929)
Degree of protection	Front: IP65 Rear: IP20
Total weight	About 1000 g

6.3 TPM104XiT

Display	
Size (diagonal) in cm (inch)	26.42 (10.4)
Type	TFT (color)
Resolution (pixels)	640 x 480
Colors	65535
Reading angle (vertical / horizontal)	145° / 160°
Backlight	LED
Half-life backlighting	50,000 h
Brightness in cd/m^2	360
Display area (H x W) in mm (Inch)	158 x 211 (6.22 x 8.307)

Electrical Data	
Supply voltage	24 V DC (SELV / PELV in accordance with DIN EN 61131)
Residual ripple	10 % maximum
Minimum voltage	18 V
Maximum voltage	30 V
Power consumption (typical at 24 V)	0.7 A
Power consumption (maximum)	1.0 A
Connected load	16.8 W
Fuse	Semiconductor fuse, self-resetting
Protection against polarity reversal	Integrated

Front Panel and Enclosure	
Enclosure	Steel sheet, galvanized
Front panel material	Aluminium, brushed, black anodized
Front panel (H x W x D) in mm (Inch)	265 x 328 x 5 (10.433 x 12.913 x 0.197)
Seal	Circumferential rubber seal on the rear
Mounting cutout (H x W) in mm (Inch)	238 x 303 (9.370 x 11.929)

Front Panel and Enclosure	
Mounting depth in mm (Inch)	57 (2.244)
Degree of protection	Front: IP65 Rear: IP20
Total weight	About 2200 g

6.4 TPM121XiT

Display	
Size (diagonal) in cm (inch)	30.73 (12.1)
Type	TFT (color)
Resolution (pixels)	800 x 600
Colors	65535
Reading angle (vertical / horizontal)	140° / 160°
Backlight	LED
Half-life backlighting	50,000 h
Brightness in cd/m^2	360
Display area (H x W) in mm (Inch)	185 x 246 (7.283 x 9.685)

Electrical Data	
Supply voltage	24 V DC (SELV / PELV in accordance with DIN EN 61131)
Residual ripple	10 % maximum
Minimum voltage	18 V
Maximum voltage	30 V
Power consumption (typical at 24 V)	0.7 A
Power consumption (maximum)	1.0 A
Connected load	16.8 W
Fuse	Semiconductor fuse, self-resetting
Protection against polarity reversal	Integrated

Front Panel and Enclosure	
Enclosure	Steel sheet, galvanized
Front panel material	Aluminium, brushed, black anodized
Front panel (H x W x D) in mm (Inch)	285 x 340 x 5 (11.220 x 13.386 x 0.197)
Seal	Circumferential rubber seal on the rear
Mounting cutout (H x W) in mm (Inch)	259 x 315 (10.197 x 12.402)

Front Panel and Enclosure	
Mounting depth in mm (Inch)	62 (2.44)
Degree of protection	Front: IP65 Rear: IP20
Total weight	About 2500 g

6.5 TPM151XiT

Display	
Size (diagonal) in cm (inch)	39.1 (15.4)
Type	TFT (color)
Resolution (pixels)	1024 x 768
Colors	65535
Reading angle (vertical / horizontal)	145° / 160°
Backlight	LED
Half-life backlighting	50,000 h
Brightness in cd/m^2	480
Display area (H x W) in mm (Inch)	228 x 304 (8.976 x 11.968)

Electrical Data	
Supply voltage	24 V DC (SELV / PELV in accordance with DIN EN 61131)
Residual ripple	10 % maximum
Minimum voltage	18 V
Maximum voltage	30 V
Power consumption (typical at 24 V)	1.0 A
Power consumption (maximum)	1.4 A
Connected load	24 W
Fuse	Semiconductor fuse, self-resetting
Protection against polarity reversal	Integrated

Front Panel and Enclosure	
Enclosure	Steel sheet, galvanized
Front panel material	Aluminium, brushed, black anodized
Front panel (H x W x D) in mm (Inch)	338 x 400 x 5 (13.307 x 15.748 x 0.197)
Seal	Circumferential rubber seal on the rear
Mounting cutout (H x W) in mm (Inch)	312 x 373 (12.283 x 14.685)

Front Panel and Enclosure	
Mounting depth in mm (Inch)	62 (2.44)
Degree of protection	Front: IP65 Rear: IP20
Total weight	About 3600 g

Front Panel and Enclosure	
Enclosure	Steel sheet, galvanized
Front panel material	Aluminium, brushed, black anodized
Front panel (H x W x D) in mm (Inch)	338 x 400 x 5 (13.307 x 15.748 x 0.197)
Seal	Circumferential rubber seal on the rear
Mounting cutout (H x W) in mm (Inch)	312 x 373 (12.283 x 14.685)
Mounting depth in mm (Inch)	62 (2.44)
Degree of protection	Front: IP65 Rear: IP20
Total weight	About 3600 g

7 Ordering Data

Table 7-1 Accessories

Description	Part No.
CompactFlash card 256 MB	81152.255
CompactFlash card 512 MB	81152.511
CompactFlash card 2 GB	81152.201
CompactFlash adaptor for laptops	81166.000
CompactFlash adaptor for PC	81167.000
USB 2.0 stick 1 GB	81152.100
Battery, assembled with cable and connector (Type CR2450)	66779.000
Protective foil for touch screen 5.7" (Set with 10 protective foils, scraper and instructions)	81251.058
Protective foil for touch screen 6.5" (Set with 10 protective foils, scraper and instructions)	81251.065
Protective foil for touch screen 7" (Set with 10 protective foils, scraper and instructions)	81251.070
Protective foil for touch screen 10.4" (Set with 10 protective foils, scraper and instructions)	81251.104
Protective foil for touch screen 12.1" (Set with 10 protective foils, scraper and instructions)	81251.121
Protective foil for touch screen 15" (Set with 10 protective foils, scraper and instructions)	81251.150

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